

CONTROL MEASURES AND REDUCTION ESTIMATES FOR THE NORTHERN SHENANDOAH VALLEY OZONE EARLY ACTION PLAN

1. INTRODUCTION

This enclosure contains information concerning the various control measures that have been included in the Northern Shenandoah Valley Ozone Early Action Plan. A total of 17 measures are identified, quantified (for emission reductions), and documented. These measures range from federal control programs (motor vehicle standards), state programs (CTG RACT), and local controls. The cumulative impact of these measures in the future attainment year (2007), as compared to the base and interim inventory years (1999 & 2002), is presented in Table 1.

Table 1: Northern Shenandoah Valley EAP Emissions Inventory Summary

Source Category	1999 (Baseline)	2002 (Interim)	2007 (Base Case)	2007 (Control Case)
<i>Volatile Organic Compound (VOC) Emissions in tons/day</i>				
Point Sources	6.019	5.638	6.492	6.068
Area Sources	7.806	7.982	8.221	7.081
Non-road Sources	2.450	2.612	2.911	1.885
Mobile Sources	6.750	6.250	5.373	4.786
Totals:	23.025	22.482	22.997	19.820
Reductions:	NA	-0.543	-0.028	-3.205
<i>Oxides of Nitrogen (NO_x) Emissions in tons/day</i>				
Point Sources	0.745	0.934	1.075	0.675
Area Sources	2.526	2.603	2.734	2.612
Non-road Sources	1.840	1.961	2.183	1.792
Mobile Sources	13.640	13.020	11.888	9.503
Totals:	18.751	18.518	17.880	14.582
Reductions:	NA	-0.233	-0.871	-4.169

A summary of the controls included in this analysis is presented in Table 2 below. These measures cover all anticipated emissions reduction that can be expected in the Northern Shenandoah Valley area by the attainment year of 2007. Additional refinement of these emissions reduction estimates may be warranted as additional information becomes available through the EAP process. These reduction estimate were developed using the appropriate guidance, methods, and assumptions for developing such estimates and represent our current best estimate of the impact of these control measures on ozone precursor emissions in the Northern Shenandoah Valley area.

Control Measures & Estimated Emissions Reductions (From Uncontrolled Levels in 2007)

Emissions Control Measures	VOC (tpd)	NO _x (tpd)
<i>State/Federal Area Source Controls</i>		
Architectural & Industrial Paints	0.133	0.000
Consumer Products	0.059	0.000
Metal Cleaning Solvents	0.056	0.000
Motor Vehicle Refinishing	0.003	0.000
Cutback Asphalt	0.001	0.000
Subtotals:	0.252	0.000
<i>Federal Non-road Source Controls</i>		
Small Gasoline Engine Standards	0.954	0.049
Diesel Engine Standards	0.000	0.311
Locomotive Engine Standards	0.000	0.019
Large Gasoline Engine Standards	0.005	0.002
Recreational Engine Standards	0.003	0.00
Subtotals:	0.962	0.381
<i>Federal Mobile Source Controls</i>		
Previous Motor Vehicle Standards (from 1999 levels)	1.377	1.752
Tier 2 Vehicle Standards	0.438	1.825
Heavy Duty Diesel Standards	0.001	0.111
Subtotals:	1.816	3.688
<i>Local Area Early Action Plan Controls</i>		
Existing Source CTG RACT Controls *	0.792	0.400
Ozone Action Days Program **	0.302	0.015
VMT Reduction Program	0.148	0.299
Open Burning Restrictions (Area)	0.280	0.123
Engine Idling Restriction (Mobile)	TBD	TBD
School Bus Retrofit Program (Mobile)	0.001	0.000
Voluntary Point Source Reductions (Point)	TBD	TBD
Subtotals:	1.523	0.837
TOTALS:	4.553	4.906

* Implemented by State Regulation

** To be supported by State Ozone Forecasts

1. Federal Architectural & Industrial Paint Controls

This measure involves the federal rule for Architectural and Industrial Maintenance (AIM) Coatings, which restricts the VOC content of architectural, industrial maintenance, special industrial, and highway markings surface coatings sold and used in the Roanoke area.

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without AIM rule)	0.669
2007(with AIM rule)	0.536
Reduction:	-0.133

Emission Reduction Calculations

The emission reduction estimate has been developed by applying the established 20% VOC emission reduction estimate for the AIM Rule to the appropriate uncontrolled coatings categories.

2. Federal Consumer/Commercial Products Controls

This measure involves the federal rule for certain consumer and commercial products, which restricts the VOC content of these products sold and used in the Roanoke area.

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without CC rule)	0.558
2007(with CC rule)	0.530
Reduction:	-0.059

Emission Reduction Calculations

The emission reduction estimate has been developed by applying the established 10% reduction estimate to uncontrolled consumer/commercial solvent emissions.

3. Federal Metal Cleaning Solvent Controls

This measure involves the federal rule for metal cleaning solvents, which restricts the VOC content of these solvents sold and used in the Roanoke area.

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without cleaning solvent rule)	0.563
2007(with cleaning solvent rule)	0.507
Reduction:	-0.056

Emission Reduction Calculations

The emission reduction estimate has been developed by applying the established 10% reduction estimate for the metal cleaning solvent rule to the appropriate uncontrolled coatings categories.

5. Federal Motor Vehicle Refinishing Paint Rule

This measure involves the federal rule for motor vehicle refinishing paint, which restricts the VOC content of these paints sold and used in the Roanoke area.

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without refinishing rule)	0.008
2007(with refinishing rule)	0.005
Reduction:	-0.003

Emission Reduction Calculations

The emission reduction estimate has been developed by applying the established 36% reduction estimate for the auto refinishing rule to uncontrolled emissions.

6. State Cutback Asphalt Restriction

This measure involves the restriction of the use of “cutback” asphalt in the Roanoke area. This will be required by State regulation beginning in 2005.

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without asphalt restriction)	0.001
2007(with asphalt restriction)	0.000
Reduction:	-0.001

Emission Reduction Calculations

The emission reduction estimate has been developed by applying the established 80% control estimate to uncontrolled emissions.

8 Federal Small Gasoline Engine Standards

This measure involves EPA's establishment of engine emissions standards for small spark ignition gasoline powered nonroad engines. These engine standard have been implemented in two phases by EPA covers both handheld and non-handheld equipment such as lawn & garden and industrial equipment

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without engine standards)	2.396
2007(with engine standards)	1.442
Reduction:	-0.954

Projected Reductions (NO_x)

Emissions Scenario	NO _x Emissions (Tons/day)
2007 (without engine standards)	0.190
2007(with engine standards)	0.141
Reduction:	-0.049

Emission Reduction Calculations

The VOC emission reduction estimate have been developed by applying the EPA established 30% emission reduction from equipment covered by Phase 1 standards only, and 40% emission reduction for equipment covered by Phase 1&2 in 2005. The minor NO_x reduction were calculated in a similar manner.

8. Federal Nonroad Diesel Engine Standards

This measure involves emission reductions from EPA emissions standards for non-road compression-ignition (diesel-powered) utility engines. This measure affects diesel-powered construction equipment, industrial equipment, and others rated at or above 37 kilowatts (~50 horsepower).

Projected Reductions (NO_x)

Emissions Scenario	NO _x Emissions (Tons/day)
2007 (without engine standards)	1.142
2007(with engine standards)	0.832
Reduction:	-0.311

Emission Reduction Calculations

The NO_x emission reduction estimate have been developed by applying the EPA established 27% emission reduction from equipment covered by these standards in 2007.

9. Federal Locomotive Engine Standards

This measure involves NO_x emission standards for locomotive engines manufactured or remanufactured after 2001. This program includes all locomotives originally manufactured from 2002 to 2004, and the remanufacture of all engines built since 1973

Projected Reductions (NO_x)

Emissions Scenario	NO _x Emissions (Tons/day)
2007 (without engine standards)	0.046
2007(with engine standards)	0.027
Reduction:	-0.019

Emission Reduction Calculations

The NO_x emission reduction estimate have been developed by applying the EPA established 42% emission reduction from equipment covered by these standards in 2007.

10. Federal Large Gasoline Engine Standards

This measure involves VOC emission standards for large industrial spark-ignition engines, recreational Vehicles, and diesel marine engines.

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without engine standards)	0.023
2007(with engine standards)	0.017
Reduction:	-0.005

Projected Reductions (NO_x)

Emissions Scenario	NO _x Emissions (Tons/day)
2007 (without engine standards)	0.011
2007(with engine standards)	0.008
Reduction:	-0.002

Emission Reduction Calculations

The VOC emission reduction estimate have been developed by applying the EPA established 24% emission reduction from equipment covered by these standards in 2005. The NO_x reduction estimate is based on a 21% reduction in 2005.

11. Federal Spark Ignition Marine Engine Standards

This measure involves VOC emission standards for spark-ignition marine engines including outboard engines, personal watercraft engines, and jet boat engines.

Projected Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without engine standards)	0.012
2007(with engine standards)	0.009
Reduction:	-0.003

Emission Reduction Calculations

The VOC emission reduction estimate have been developed by applying the EPA established 25% emission reduction from equipment covered by these standards in 2005.

12. Federal Onroad Motor Vehicle Emissions Standards

The following national motor vehicle emission reduction measures have or will be implemented that will reduce mobile source emissions in the early action area. These measures are:

- Federal Tier 1 Vehicle Standards
- National Low Emissions Vehicle Standards
- Federal Tier 2 Vehicle & Low Sulfur Fuel Standards
- Heavy Duty Diesel Engine Standards

These measures impact most motor vehicle classes and establish engine and other emissions standard for Vehicles based on model years. The reductions from these measures normally accumulate over time as new vehicles subject to these standards replace older, dirtier vehicles.

Projected Reductions (VOC)

Tier 1 Vehicle Standards and National Low Emissions Vehicle Programs

Emissions Scenario	VOC Emissions (Tons/day)
1999 Base Year	6.750
2007 Attainment Year (with Tier 1 & NLEV)	5.373
Tier 1/NLEV Reduction:	-1.377

Tier 2 Vehicle Standards

Emissions Scenario	VOC Emissions (Tons/day)
2007 (Tier 1 & NLEV)	5.373
2007 (with Tier 2)	4.935
Tier 2 Reduction Benefit	-0.438

Heavy Duty Diesel Engine Standards

Emissions Scenario	VOC Emissions (Tons/day)
2007 (Tier 1&2, NLEV)	4.935
2007 (with HDDV)	4.934
Tier 1/NLEV Reduction Benefit	-0.001

Projected Reductions (NO_x)

Tier 1 Vehicle Standards and National Low Emissions Vehicle Programs

Emissions Scenario	NO_x Emissions (Tons/day)
1999 Base Year	13.640
2007 Attainment Year (with Tier 1 & NLEV)	11.888
Reduction:	-1.752

Tier 2 Vehicle Standards

Emissions Scenario	NO_x Emissions (Tons/day)
2007 (Tier 1 & NLEV)	11.888
2007 (with Tier 2)	10.063
Reduction:	-1.825

Heavy Duty Diesel Engine Standards

Emissions Scenario	NO_x Emissions (Tons/day)
2007 (Tier 1&2, NLEV)	10.063
2007 (with HDDV)	9.952
Reduction:	-0.111

Emission Reduction Calculations

All emission reduction calculations for motor vehicles have been developed using the EPA MOBILE6 emissions model. Detailed information on the calculation of these reductions can be provided upon request.

13. State Existing Source CTG RACT Controls

This measure involves the implementation of Control Technology Guideline (CTG) "Reasonably Available Control Technology" to selected point and area sources in the Roanoke area. This will be required by State regulation beginning in 2005.

Projected Point Source Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without RACT)	6.492
2007 (with RACT)	6.068
Reduction:	-0.424

Projected Point Source Reductions (NO_x)

Emissions Scenario	NO _x Emissions (Tons/day)
2007 (without RACT)	1.075
2007 (with RACT)	0.675
Reduction:	-0.400

Projected Point & Area Source Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without RACT)	0.706
2007 (with RACT)	0.337
Reduction:	-0.368

Emission Reduction Calculations

The point source VOC and NO_x emission reductions are based on source specific reduction estimates from selected major sources. The area source VOC emission reductions are based on 50% to 70% reduction of emissions from solvent cleaning and graphic arts operations.

14. Ozone Action Days & Vehicle Travel Reduction Programs

This measure involves a combination of voluntary and mandatory episodic restrictions on ozone precursor emissions producing activities during predicted

high ozone day. These activities include vehicle travel, landscaping, vehicle refueling, solvent usage, pesticide application, and others. This program will be support by the State ozone forecasting program.

Projected Mobile, Area, & Nonroad Source Reductions (VOC)

Emissions Scenario	VOC Emissions (Tons/day)
2007 (without program)	12.762
2007 (with program)	12.311
Reduction:	-0.450

Projected Mobile & Nonroad Source Reductions (NO_x)

Emissions Scenario	NO_x Emissions (Tons/day)
2007 (without program)	10.252
2007 (with program)	9.939
Reduction:	-0.313

Emission Reduction Calculations

Emissions reductions were based on a projected activity and emissions reduction of 3% to 5% from the emissions sources impacted. The higher reduction of 5% was used for activities that had a state/local mandatory restriction component.

15. Local Open Burning Restrictions

This measure involves a combination of voluntary and mandatory restriction of open burning activities relating to land clearing and activities. Several jurisdictions have adopted local ordinance to this effect. Others have committed to an episodic restriction on these activities on predicted high ozone days.

Projected Reductions (VOC)

Emissions Scenario	NO_x Emissions (Tons/day)
2007 (without program)	0.350
2007 (with program)	0.070
Reduction:	-0.280

Projected Reductions (NO_x)

Emissions Scenario	NO_x Emissions (Tons/day)
2007 (without program)	0.153
2007 (with program)	0.031
Reduction:	-0.123

Emission Reduction Calculations

Emissions reductions were based on a projected activity and emissions reduction of 80% from the emissions sources impacted.